

R16

Code No: 134AM

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, September/October - 2023

CONTROL SYSTEMS
(Common to EEE, ECE)

Time: 3 Hours

Max. Marks: 75

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

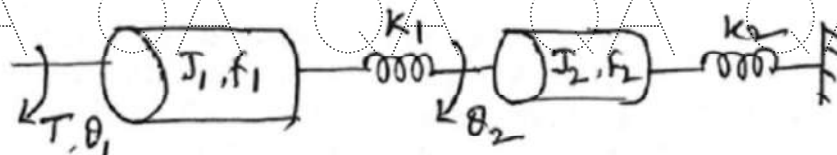
(25 Marks)

- 1.a) How the control systems are classified? [2]
- b) State and explain Mason's gain formula. [3]
- c) Define the terms (i) Rise time (ii) Delay time. [2]
- d) Describe the PID controllers. [3]
- e) What is frequency response? And, define corner frequency. [2]
- f) What is break-away and break-in point? How to determine them? [3]
- g) What is the need of lag-lead compensator? [2]
- h) What is the difference between polar plot and Nyquist plot? [3]
- i) What are the demerits of state variable techniques? [2]
- j) What are the advantages of canonical form? [3]

PART – B

(50 Marks)

- 2.a) Explain the necessity and effect of feedback in control systems.
- b) Find the transfer function $\theta_2(s)/T(s)$ for a given rotational mechanical system is as shown in figure. [5+5]



OR

- 3.a) What are the important rules of the block diagram reduction techniques?
- b) Derive the transfer function of armature-controlled DC servomotor. [5+5]
- 4.a) Derive an expression for the time response of a second-order system excited by a unit step Input.
- b) A closed loop system has two complex conjugate poles at $S_1, S_2 = -2 \pm j1$. Determine the form of transfer function and values of natural frequency of oscillations of the system (ω_n), time (T_p), Rise time (T_r), Settling time (T_s) and Peak Overshoot (M_p) assuming standard second-order system. [5+5]

